

A Survey of the Community's Use
of New Analytical Methods

DOS, OSD and DIA review(s) completed.

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Synopsis

The Intelligence Community is actively seeking to develop and apply promising new analytical techniques. Community agencies already use a number of new analytical methods and are considering and experimenting with others. Interest in these methods varies from agency to agency and from office to office, the differences due in part to the greater susceptibility of some kinds of work to quantitative treatment than others.

Both the Central Intelligence Agency and the Defense Intelligence Agency routinely use sophisticated analytical methods in their studies of military forces and weapons. CIA has, in addition, applied new techniques to political, economic, and cartographic research. In both agencies, formal courses are held to introduce analysts to new methods. The Department of State, whose work lends itself less easily to the use of quantitative techniques, has commissioned comprehensive studies of the usefulness of new analytical methods (and of other developments in the social sciences) to political research. The Advanced Research Projects Agency of the Department of Defense is applying new techniques to several fields of interest to the Intelligence Community, including forecasting and early warning.

It would be premature to judge the value of many of the methods which are described in the body of this report. Clearly, however, the exploration of new methods of analysis is a valuable Community exercise. More important than any particular new technique is this general willingness to think critically about the way in which analysis is conducted, to consider whether there are not more informative ways of ordering the same information, whether a tried analytical method is in fact applicable to novel problems, and whether traditional methods are best suited to the interpretation of information from new kinds of sources.

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A Survey of the Community's Use of New Analytical Methods

Introduction

"New analytical methods" is a notoriously imprecise term, one that has at times been applied without much discrimination to techniques that are neither new nor, strictly, analytical. This paper compromises with that imprecision. On the one hand, the methods that it surveys are analytical ones; they are, that is, explicit and systematic ways of ordering and interpreting facts, and are not simply devices or arrangements for storing, transmitting or presenting information, however necessary and helpful these are. Construed in this way, furthermore, analytical methods are not necessarily dependent on a computer, and the use of a computer is here considered neither necessary nor sufficient evidence that an analytical method is being applied.

On the other hand, one must be somewhat less demanding with respect to the novelty of these methods. While their use in intelligence (particularly in political analysis) is, with some important exceptions, recent, many of these methods have been used for some time by political scientists,

This paper is based on discussion with analysts throughout the Community who are now involved in the development of new methods, on written pre'cis of their work which some helpfully provided and on a summary of its efforts in this field by CIA's Directorate of Intelligence. ("Progress on New Methodologies in the DDI," 21 August 1974.)

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economists and corporate managers. It is, of course, only their application to intelligence that is of concern here, and in that application many of them are indeed new.

As the phrase is used here, "new analytical methods" refers only to those techniques designed for political, economic, and military intelligence. But for the same reason that a discussion of new techniques for scientific analysis is excluded from this study--because such methods are less apt to represent a fundamental departure from previous ones--it is something of a distortion to speak of new analytical methods in economic intelligence, a field in which quantitative methods have long been used and in which the need continually to adapt methods to new emphases and new subjects seems well accepted. This is reflected in the rather brief treatment given here of the work of the Office of Economic Research.

The Promise of New Techniques

New methods should enhance analysis in several ways. When they are appropriately used, they demand, if not the elimination, at least an explicit expression of subjective judgments, which are then more readily weighed and amended. Where information can, without distortion, be expressed numerically, these methods permit greater precision and the systematic consideration of a great many more influences on an event than would be possible without them. Indeed,

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some problems are so complex--like the hypothetical exchange of nuclear weapons, the study of the influences on the world's trade in a certain commodity, or the causes of political violence--that some explicit and, if it is possible, quantitative method of analysis may be necessary for genuinely comprehensive treatment.

New problems may require the revision and even the abandonment of previously useful approaches and the creation of original ones; the development of "military economics" is an example. Similarly, new sources of intelligence may demand new methods of interpretation and analysis, particularly if the sources are prolific and are to be exploited fully; instances are the diverse ways in which satellite photography is being exploited. But perhaps the most important if not the most obvious fruit of the development of these new methods is the opportunity it provides to step away from the actual work of analysis and to examine the assumptions which have guided it.

Despite these merits, an unequivocal recommendation of new methods is not intended. The belief that all or even most of the many new techniques developed for, say, political analysis can be successfully adapted to intelligence is unfounded. Many such methods demand a great deal more information than is normally accorded analysts. Moreover, while not all new techniques are quantitative ones,

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many are, and some issues simply do not lend themselves to numerical treatment.

Even when these reservations do not apply, even when a new analytical method might in principle be applied to intelligence, it may be evident after some examination that it is unnecessary or unwise to do so. Unnecessary because in many instances conventional forms of analysis will be quite sufficient. Unwise because the particular method may require more time or more specialized analytical skills than an office can be expected to provide, and more sophistication and more patience than readers can be expected to bring to bear.

Much of the Community's use of new analytical methods, particularly for political analysis, is still tentative and experimental, and appropriately so. These investigations, furthermore, are often done at various removes from the actual production of intelligence, and that is probably appropriate as well. Certainly some freedom from the insistent press of business is needed for the considered adaptation of promising methods to analytical problems, even in offices in which the use of quantitative methods is already common. The establishment of groups within analytical offices to concentrate on such experimentation and the letting of contracts for the same purpose offer at least the possibility of this freedom.

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Nevertheless, the importance of actively involving analysts in these investigations and early applications should always be borne in mind. Analysts should be able to ensure that any methods developed or adapted for intelligence promise real benefits. New methods should also be introduced in such a way that the sophistication of analysts with regard to these techniques is increased, a benefit not likely to be realized if new methods are developed or used entirely apart from the analysts, whether by contractors or by small groups within the Community with only formal links to other analysts. Some balance needs to be struck, then, between imposing additional burdens on already busy analysts and subjecting this preliminary work to the risk of sterility.

What follows is a survey of the development, the adaptation and in some instances the already routine use of new analytical methods by the Defense Intelligence Agency, the Central Intelligence Agency and the Bureau of Intelligence and Research of the Department of State. Several projects which the Defense Advanced Research Projects Agency is conducting are sketched as well.*

*Although the National Security Agency has devised sophisticated methods for using computers in the analysis of signals intelligence, it is not now experimenting with the kinds of analytical methods that are treated here.

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THE CENTRAL INTELLIGENCE AGENCY

Office of Current Intelligence

The Office of Current Intelligence has charged its Methods and Technology Staff with acquainting analysts in OCI with new analytical methods. The Staff encourages the use of those qualitative and quantitative techniques that its own studies suggest are applicable to intelligence.

As part of its educational work, the Staff publishes a newsletter, Notes on Methodology, each issue of which describes the basic principles and possible uses of a promising technique. Some of the articles have treated specific analytical problems, for whose solution novel methods have proven useful. Notes on Methodology is widely distributed within CIA and, because it is an informal publication, can be prepared economically. In conjunction with the newsletter, the Staff has carried out a series of briefings to educate analysts in the use of new techniques. It has also published a comprehensive Glossary of Terms and Techniques for Political Analysis, a unique and particularly helpful guide through the sometimes obscure language of these methods.

OCI has furthered the education of its analysts in these techniques in a variety of other ways, enrolling

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officers in courses offered by the Office of Training and sending analysts to attend academic conventions on this subject. In addition, the office recently sponsored, in conjunction with the Office of Research and Development, a symposium on the subject of The par- 25X1B
ticipants in the symposium included analysts not only from OCI but from other parts of CIA and from the State Department and several universities as well.

The Methods and Technology Staff also assists in applying new analytical methods to current problems, and of course such efforts also serve to acquaint the current intelligence analysts involved in the project with whatever technique is being employed. The Staff's primary intention in this respect is to tailor new methods and new ways of presenting analysis to the particular demands of current intelligence. The Staff emphasizes approaches which do not require lengthy preparation, specialized data, or the extensive use of computers. The fruits of this emphasis

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OCI has begun work on a number of political models which should assist current analysts in refining their perceptions of a country's politics and of relations between countries. A preliminary version of a model representing conflict over sources of energy, both within a country and internationally, has been completed for OCI by [redacted] 25X1A (ORD providing most of the funds). The model is designed to point out specific deficiencies in our knowledge of such conflicts and to refine our understanding of the complexities of international competition. [redacted], is also assisting 25X1A OCI in the preparation of a quantitative analysis of terrorism in Argentina.) Modeling and simulation are techniques which may be of particular use when a number of OCI analysts are dealing with various parts of a larger issue.

The Methods and Technology Staff recently made a "UN Voting File" available to analysts in OCI. Designed by the Political Science Department of the US Naval Academy and the Office of Management Systems of the Department of

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State, the file allows analysts to obtain quickly the voting records both of individual members and of certain groups within the United Nations. It also permits detailed comparisons of such records.

It is important to note, however, that while OCI is experimenting with a number of promising new methods, the office has reservations about the usefulness of some techniques for current intelligence. The office believes that much of the information with which it works cannot be expressed numerically without grave distortion and that, in any case, some of these methods demand more time and preparation than the character of the office's work allows.

Office of Political Research

The Analytical Techniques Group (ATG) within the Office of Political Research is responsible for the application of novel, frequently statistical approaches to the analysis of political intelligence. Its work includes the adaptation of existing techniques used in universities and private industry, as well as the creation of new techniques and arrangements to suit the unique needs of intelligence production. In the nearly two years since its creation, ATG has achieved some of its most fruitful results in developing ways of bringing the opinions of a number of experts to bear upon selected subjects in a rigorous manner, and in using new devices for the graphic communication of finished intelligence.

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The following list of projects illustrates the scope of OPR's work in these new methods:

a. Beginning in December 1973 the Analytical Techniques Group applied the Bayesian technique of analysis in asking a group of experts to assess "The Likelihood of a Major North Vietnamese Offensive." This exercise at first involved only Agency analysts. After the favorable reception of the study's periodically published reports, it was expanded in February 1974 at the request of the DCI and the United States Intelligence Board to include experts from several agencies in the Intelligence Community. Both phases of this Bayesian analysis were concluded in June 1974, and an evaluation was published shortly thereafter.

b. Since June 1974 the Office has conducted Bayesian analyses of two topics: "The Likelihood of Sino-Soviet Hostilities" and "The Likelihood of Arab-Israeli Hostilities." In each case the analysis has been designed to examine a range of possible outcomes beyond the basic problem of whether there will be a war. Reports are issued every six weeks for the Sino-Soviet study and biweekly for the Middle East project.

c. Based on its experience in these projects, the Analytical Techniques Group has published a handbook on the application of Bayesian analysis to intel-

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ligence. This publication was put together to explain the technique and to encourage its use as a device which would complement traditional ways of looking at political or strategic phenomena. The group has also developed computer routines in various machine languages which will assist an individual or group in the conduct of a Bayesian exercise.

d. ATG has developed an operational analytical model for assessing the causes and consequences of political violence. The first phase of this project involved the establishment and adaptation of the model, developed by [redacted] The model was tested in a historical case study of the Chilean coup to determine its usefulness in gauging situations of potential political conflict. The second phase, now in progress, is designed to test further the diagnostic and predictive powers of the model. Specifically, it involves the application of the model to certain countries--Ethiopia, Thailand and Argentina--in which political dissension and popular dissatisfaction appear to be significant, and the publication of monthly analytical reports based on this use of the model.

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e. The office has also staged a number of political games as a structured way of educating analysts and of

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inducing them to consider some of the assumptions which are implicit in traditional analysis. Games, which are formal devices for exposing and testing the decisions of participants who play the roles of, for example, the leaders of competing states, have been run on the following subjects: (1) the dispute involving the Iraqis, the Iranians, and the Kurds; (2) the potential for conflict on the border separating Chile and Peru; and (3) the conflict between the decision-making processes of the competing political groups in Brazil. Consideration is being given to running games on Southeast Asia and on Chinese internal politics.

f. An exercise employing Delphi techniques to study the future of the Portuguese African territories was held in the spring of 1974. Delphi--a very popular analytical technique in private industry--employs a process of repeated responses and reevaluations to identify areas of clear agreement or disagreement on a problem among experts. While it has not often been used alone as an approach to intelligence analysis, its organizational features are quite applicable to a system in which consultation and coordination among analysts are common; accordingly, some aspects of this process have been incorporated into the exercises which ATG has developed.

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h. Other projects now under way or planned to be undertaken soon will employ decision theory, cross-cultural perception analysis, and methods for designing scenarios for use in policy planning and analysis.

Office of Strategic Research

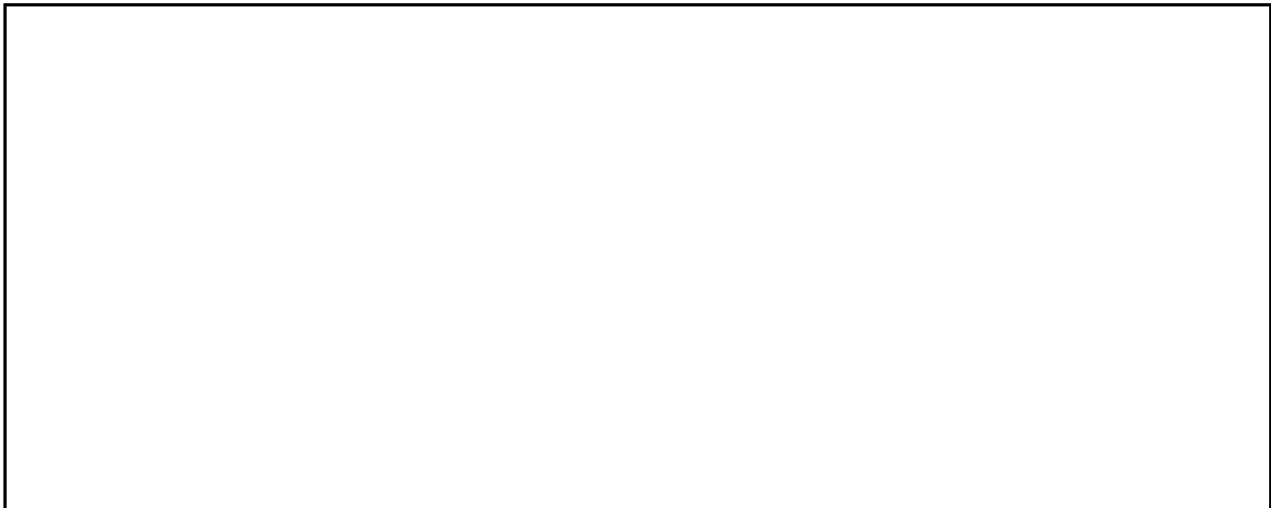
The Office of Strategic Research has for some time used quantitative techniques in describing and estimating the size, quality, deployment and costs of foreign military forces and weapons. Its Planning Staff is specifically responsible for encouraging and supervising the trial and adoption of new methods. The Office has, however,

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successfully relied upon individual analysts to initiate experiments and has found that its analysts, faced, for example, with the need to predict the results of hypothetical but enormously complex situations (e.g., an exchange of strategic weapons), continually propose new applications of quantitative methods.

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bureaucratic processes and techniques drawn from organization theory to its studies of the Soviet bureaucracy's perceptions of US military forces.

The Center has drawn up a detailed program for the refinement of existing methods and for the development of new ones, a program in which OSR will be assisted by ORD. The latter has, for example, agreed to support the design

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particular location. Also planned is the improvement of techniques which are already in use, such as a model of

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have not yet been launched. The Center will undertake as well the education of its analysts in the employment of both tried and novel techniques.

Other divisions in OSR have also bent new methods to their work. The Theater Forces Division, for example, 25X1B

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Working with the Office of

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Joint Computer Support, the division has, [Redacted]

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prepared, as part of this exploration, a model for assessing

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[Redacted]

With ORD,

the division has obtained the assistance of [Redacted]

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[Redacted]

in devising new approaches to the analysis of

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the various influences on the course of [Redacted]

In addition, appraisals by the Theater Forces Division of the conventional forces of the Soviet Union, the Warsaw Pact and NATO rely on statistical tools which often require the use of computers and particularly the use of two filing

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[Redacted]

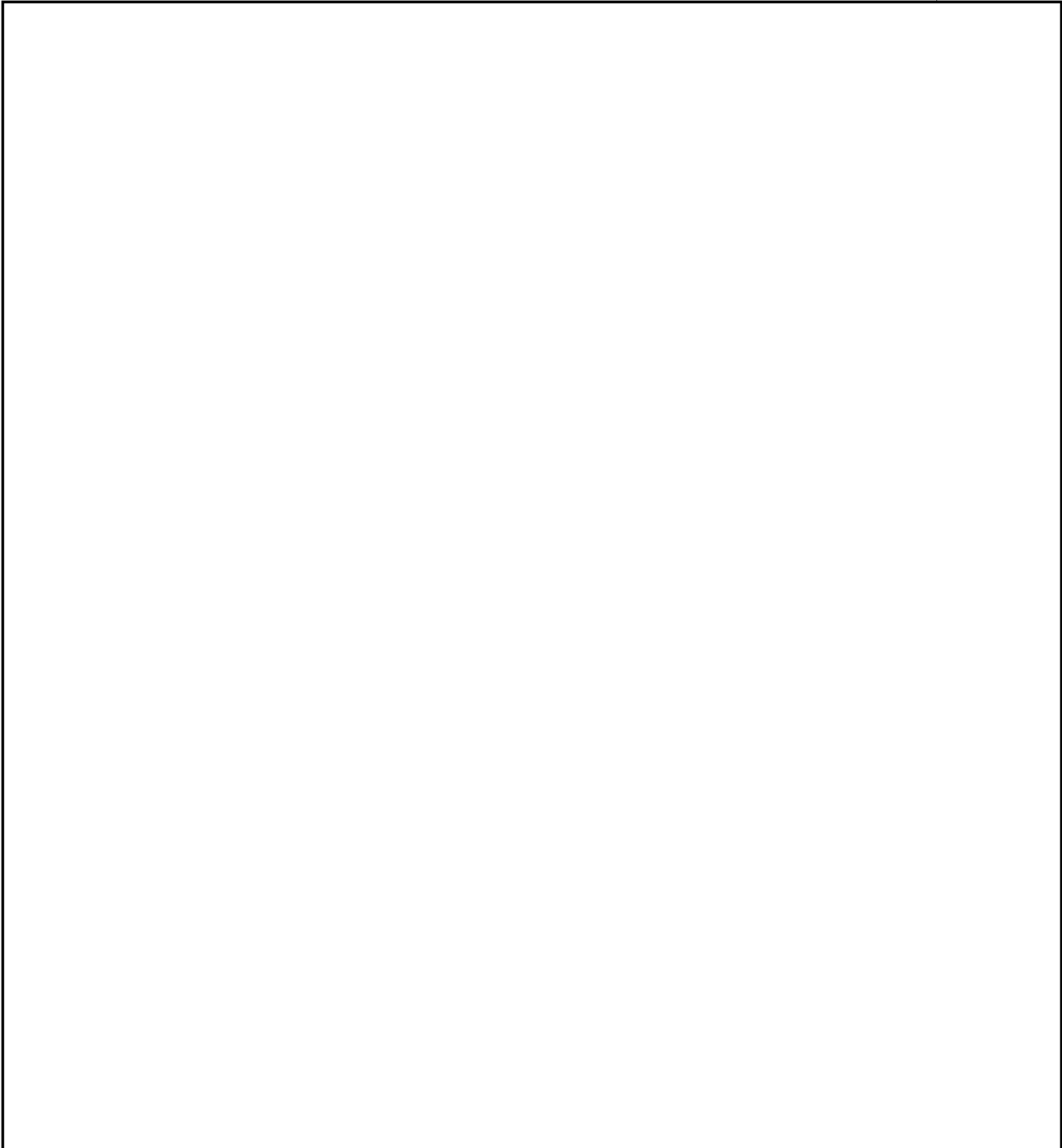
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Despite the successful and in many instances the routine use of these analytical methods, the Office retains a certain skepticism about their more general application to the kinds of studies for which it is responsible. Like analysts in OCI and other parts of the Community, analysts in OSR believe that quantitative approaches used effectively for

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academic studies often demand more information, time and preparation than are available to an intelligence agency. The paucity of information is especially a problem as, unlike an academic researcher who can in some ways choose a topic to suit a particular method, the analyst's "problem" and the information he or she can draw upon are both largely fixed. Accordingly, a technique must be adapted to a subject, if that is possible, and often it is not.

Office of Economic Research

The Office of Economic Research has, as noted previously, long used a variety of quantitative techniques in its analysis. Such methods are of course more readily applied to economic data than to information about, say, politics, and indeed economists have made sophisticated statistical descriptions and mathematical models an expected feature of their work. In a sense, then, the phrase "new analytical methods" has rather a different meaning for this office than it does for some others, for in OER it is apt to suggest refinements of quantitative approaches that already enjoy a general acceptance in economic research.

Still, such methods are often designed for the study of problems on which a great deal more information is available than is often true of issues in economic intelligence. The Office must accordingly evaluate these methods for their usefulness to intelligence and then frequently modify them. In 1968, the Office established the Systems

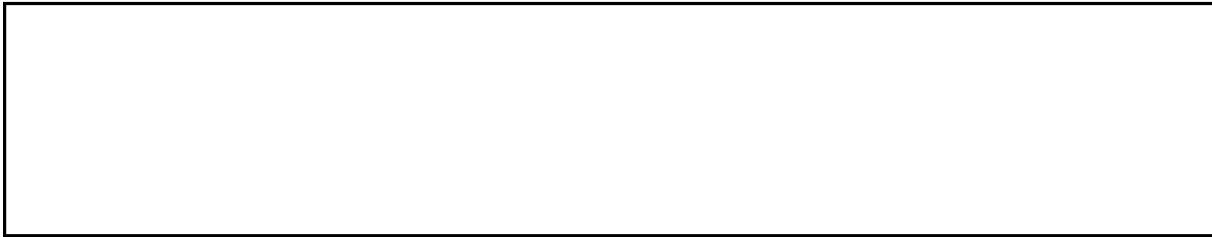
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Development Staff (recently made part of the Development and Analysis Center) to oversee this modification and adaptation of established methods to economic intelligence and to experiment with new ones as well. The working relationships enjoyed by members of the staff and other analysts in OER with economists in universities and other parts of the government aid in this task of devising and applying advanced techniques.

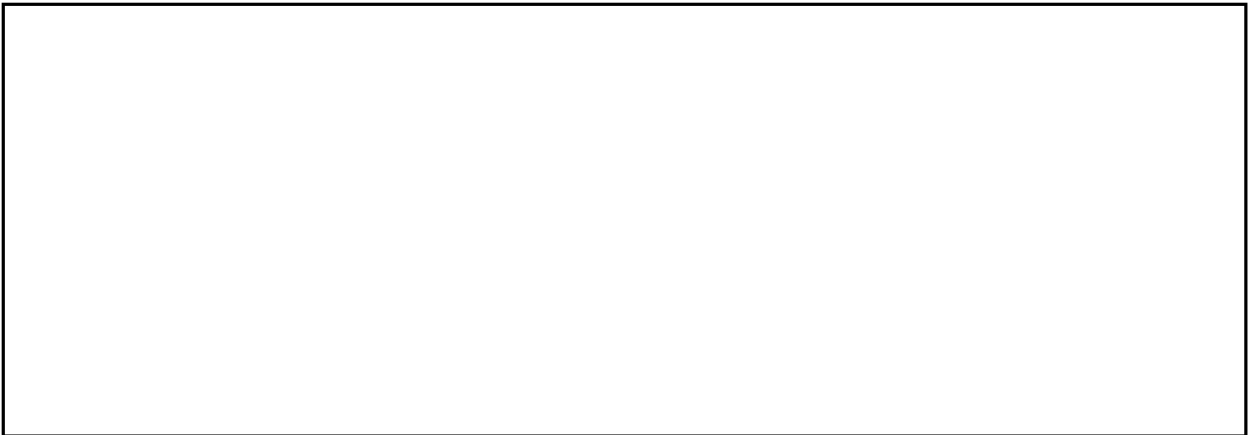
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OER uses established econometric models in its work as a matter of routine. In the last several years, the



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Efforts by OER to develop and apply its own new approaches have also been fruitful. One project employs



To encourage and facilitate the use of new methods, the Systems Development Staff has provided formal courses and individual instruction to analysts from OER and from

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other parts of the CIA as well. The Staff has trained analysts both in the employment of the techniques themselves--courses in Bayesian analysis, macroeconomic modeling and trade simulations have been provided--and in the application of computers to analytical problems.

Office of Geographic and Cartographic Research

The Office of Geographic and Cartographic Research is pursuing a number of programs in which new methods are being tested and then applied to the office's special analytical concerns. In developing and experimenting with new methods OGCR has sought the cooperation of OJCS, OSR, ORD, IAS and NPIC and that of experts in other government agencies, universities, and commercial firms. Supervising the application of new techniques is the responsibility of a special assistant to the Director.

With the assistance of academic and industrial consultants, the Office has developed new methods for exploiting satellite photography. Two techniques have been

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Similar methods may have promise in the study of such diverse topics as water resources, urban change, and the production of narcotics. Analysts in OGCR have devised techniques for using, in

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geographic and strategic intelligence, information gained

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The Cartography Division's accomplishments in developing automated cartographic systems should be noted for they do permit the manipulation as well as the storage and presentation of information. [REDACTED] is one such system for producing maps that has become an important analytical

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developed by OGCR. The Division is examining computer mapping systems in use in universities and industry for their possible application to intelligence.

The Geography Division is studying the possibilities of a computer system for storing, retrieving and manipulating geographic information. Representatives from ORD, OJCS, OSR, and OGCR are now reviewing the demands that could be made of such a system.

The Special Research Branch of the Geography Division has experimented with new statistical methods as part of a program to provide intelligence to the National Security Council for its use in preparing for the Law of the Sea negotiations. Using studies prepared by the Center for Naval Analysis, the Branch has employed

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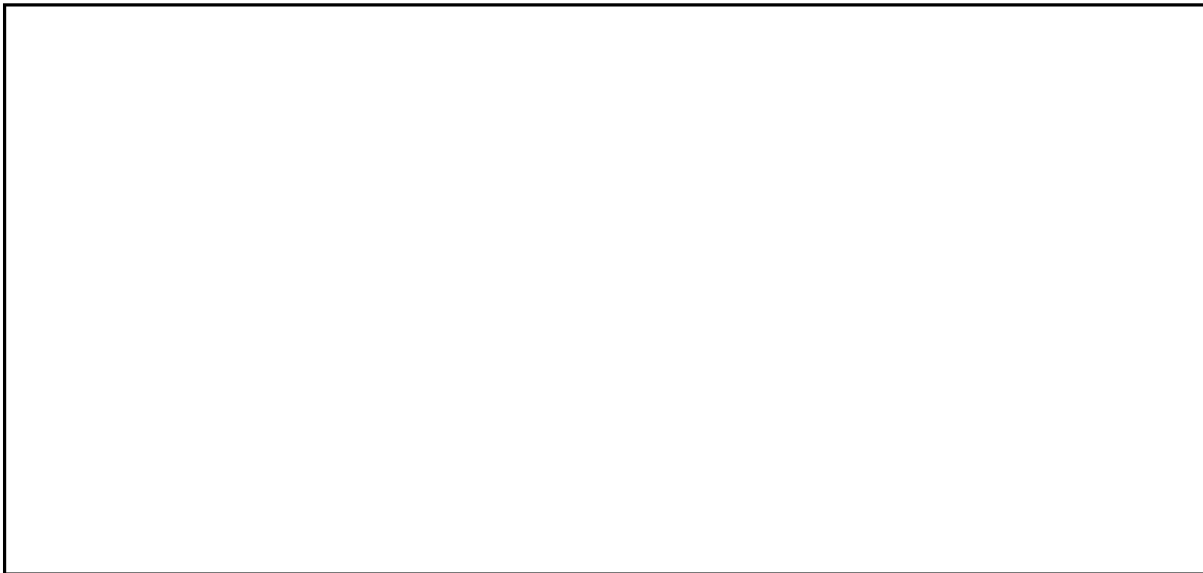
vote on various issues. OGCR plans to extend the use of these methods to such other subjects as world population and food problems.

Office of Research and Development

In 1973, the Office of Research and Development established the Center for the Development of Analytical Methodology (CDAM). The Center is responsible for devising new methods of analysis and adapting both these original techniques and pertinent existing ones to the purposes of intelligence. The members of the Center's staff have backgrounds in various fields and are thus able to work closely with analysts throughout CIA.

Although most of CDAM's work is in the areas of science and technology, it has also contributed to the development of new methods for economic and for political research. The Center assisted, for example, in devising

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the Center is investigating the value to analysts of a model of international conflict over sources of energy. This model emphasizes the political aspects of such conflict and, when it is refined, will assist analysts in assessing the policies nations may pursue in response to shortages of energy.

Analytical Support Center

The Center for the Development of Analytical Methodology also supervises the work of the Analytical Support Center. Established in November 1974, and sponsored by CIA, the Intelligence Community Staff and ARPA, the Analytical Support Center was created to permit analysts to experiment with new analytical methods which hold some promise of directly assisting them in their work. The contract for the Center was awarded  members of which bring academic qualifications in diverse disciplines to the Center's work.

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The Center will concentrate initially on the development and application of analytical techniques for the study

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topics are selected not only for their importance to the Intelligence Community but also for the extent to which new techniques developed in the course of a study can be applied to other analytical problems. An important preliminary to each study will be a survey of the academic literature on the topic, to insure both that the study will not merely duplicate a previous one and that there is enough information on the subject to make an investigation fruitful.

The Analytical Support Center also holds symposia to acquaint analysts with the merits of new analytical approaches. Techniques for analyzing [REDACTED] treated in one symposium, the study

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Office of Training

The Information Science Center of the Office of Training runs the Information Science Training Program, which is open to personnel from the entire Community. The program, now in its eighth year, emphasizes the actual use of new analytical approaches and computer systems by

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The Center for the Study of Intelligence of OTR's Intelligence Institute began in August a series of seminars in which experienced analysts examine the conduct of

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analysis in CIA. The first session discussed the topic in general, while the second and most recent seminar was devoted to a specific problem: the usefulness of multi-disciplinary analysis and the difficulty of recruiting or training analysts for this sort of research. In subsequent meetings, the participants will take up other particular features of the state of analytical work. Whether that work can be appreciably improved by the use of particular new methods has not yet been considered at any length, but such consideration is in any case less important than a more general examination, which such seminars encourage, of the pertinence of the assumptions on which traditional forms of research are based.

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The Defense Intelligence Agency

Directorate of Intelligence

The Directorate of Intelligence uses several mathematical models in its analysis of the forces of the Soviet Union and the Warsaw Pact. The Navy Branch of the Soviet/Warsaw Pact Area Division has, for example, recently begun to use a model that aids in judging the effectiveness of Soviet ballistic missile submarines. The model may eventually be used in analyses of other types of submarines and ships.

Another office in this division, the Military Geography and Movement Branch, is using a computer simulation model,

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[redacted] to study the ability of the Warsaw Pact to transport supplies. The model can be applied to any transportation network for which a study of the movement of, for instance, munitions is sought. Analysts in

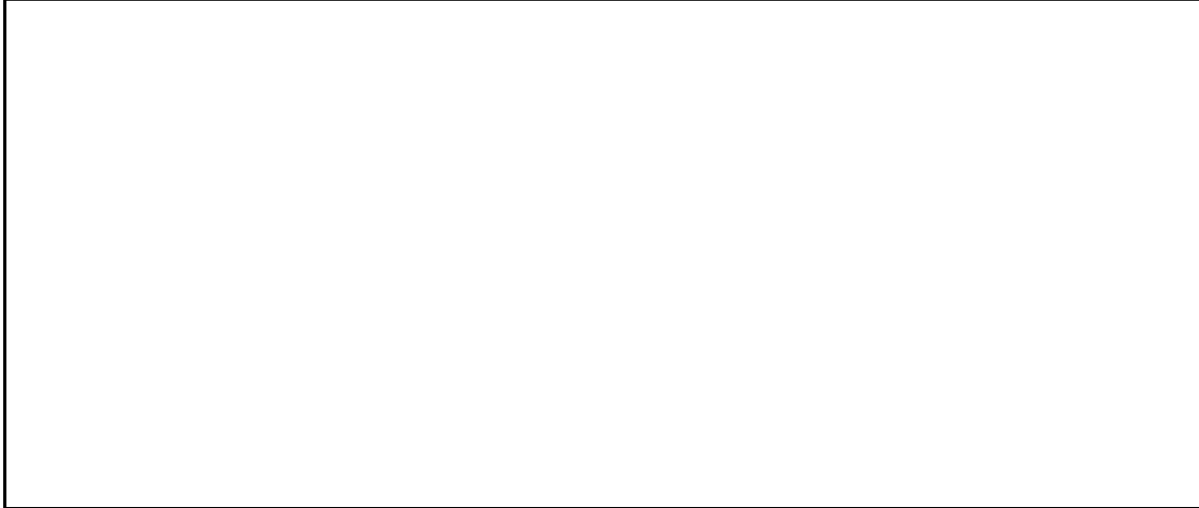
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DIA are now combining features of a file of logistical data with [redacted] and are considering a similar connection of the model with a file on ground order of battle. Such improvements would permit more detailed analysis of the ability of the Warsaw Pact to move men as well as supplies.

The Physical Vulnerability Branch of the Installation Intelligence Division has adopted techniques used in engineering to the development of intelligence about targets. One,

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The Long Range Forecasting Division of this Directorate has among its responsibilities that of encouraging the application of new analytical methods. To this end, the Division answers specific requests for help from analysts in the Directorate of Estimates, primarily by demonstrating the methods, statistical programs, and files that can, without unacceptable costs or delay, be applied to the analysts' concerns. In addition, an officer in the Division offers informal instruction in various new methods for those whose work would benefit from their use and regularly informs analysts in the Directorate of the methods and programs that might be applied to their research. The Division finds that the constant press of this kind of assistance precludes experimenting with more speculative techniques.

The Directorate is presently using a number of analytical methods and programs, developed in some cases

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with the assistance of contractors, in some cases independently. Most are designed, of course, for the analysis of military and particularly strategic problems.



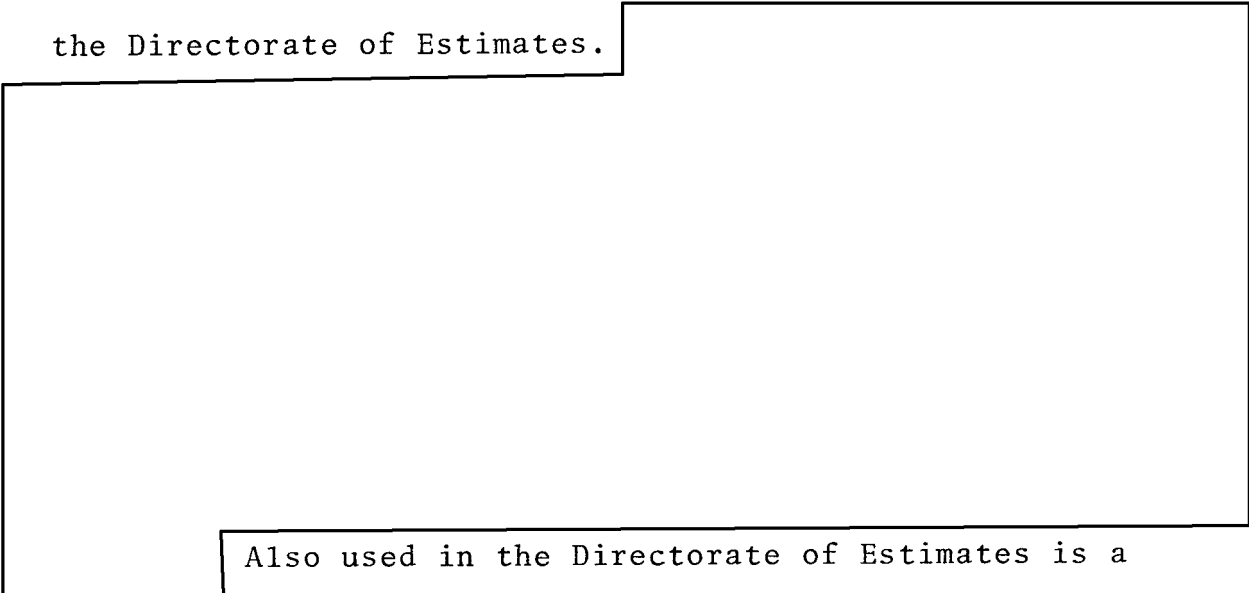
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Several arsenal exchange models are also in use in the Directorate of Estimates.

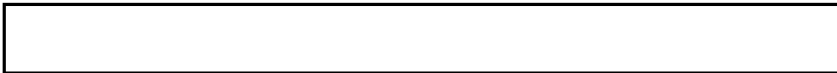
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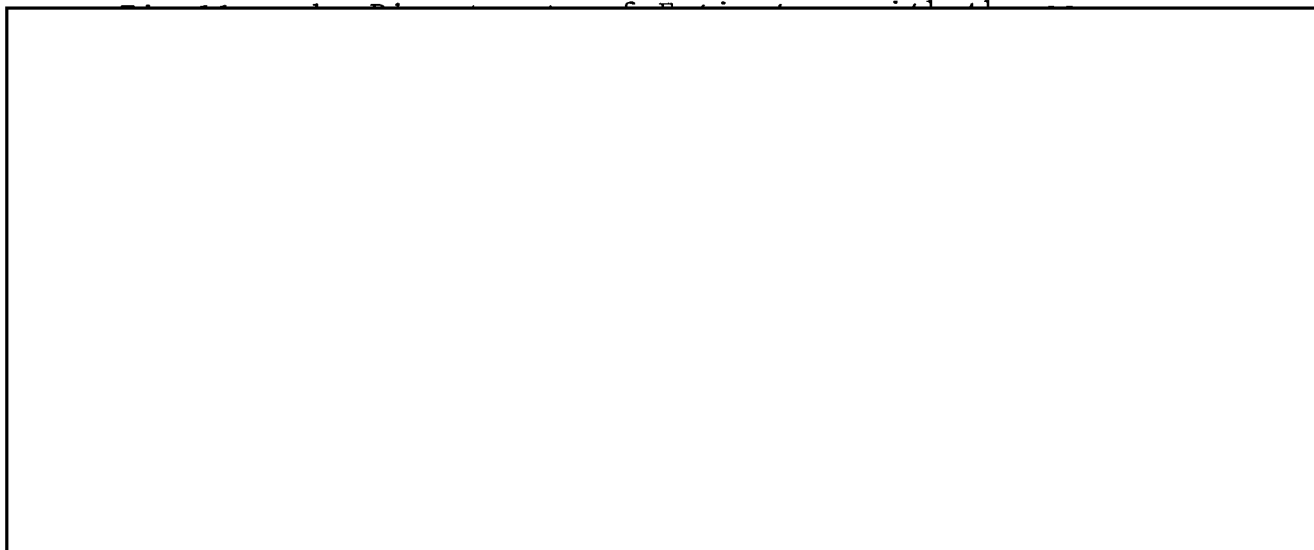
Also used in the Directorate of Estimates is a specialized model of arsenal exchanges designed by CIA, which employs the model as well.

The Support Center of the National Military Command System has designed a model for estimating the immediate effects--fallout and blast--of nuclear weapons. This, the

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 has been used extensively in war games, and in the preparation of Defense Intelligence Estimates.


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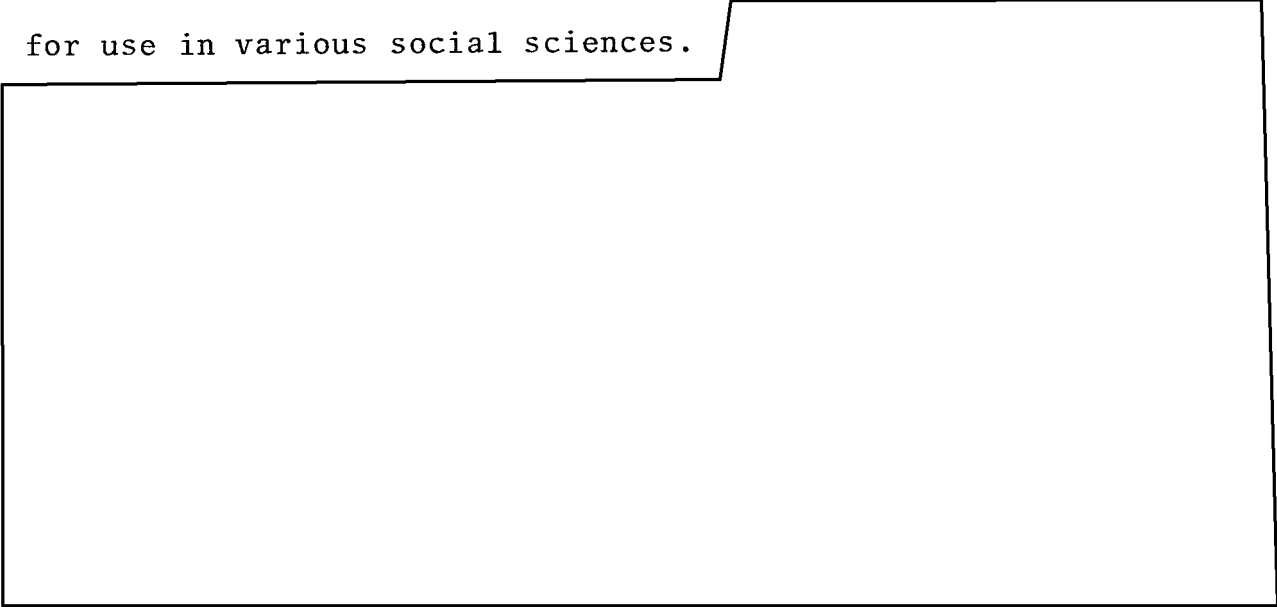
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Directorate of Collection

X1 The Collection Analysis Support System, a product of  working on a contract for DIA, is a set of statistical computer programs that has been used by the Directorate of Collection to gauge the costs and effectiveness of various systems for collecting intelligence. These programs include several for the portrayal of statistical information on maps, a geographical file derived from CIA's World Data Bank I, and a statistical package for use in various social sciences.

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While the Collection Analysis Support System has so far been used primarily in studies of collection systems, it has also been experimentally applied in the actual analysis of intelligence. It has been successfully employed, for example, in the preparation of ground order of battle, and analysts in DIA are considering other uses of this sort.

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Defense Intelligence School

During both the Management Course and the longer Post-graduate Intelligence Course of the Defense Intelligence School, students are introduced to features of the DIAOLS computer system and to the use of certain quantitative techniques, such as Bayesian analysis and queueing theory. Decision tree analysis and the program evaluation and review technique are also discussed. Officers from CIA's Information Science Center provide lectures on these methods, and the instruction is supplemented with a text prepared by the American Management Association. While the survey of these techniques is designed primarily to educate students in their use in management, it also acquaints them with the ways in which they can be employed in the analysis of intelligence.

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The Defense Advanced Research Projects Agency

The Advanced Research Projects Agency supports basic and applied research in a variety of new analytical methods, some of which have already been employed by the intelligence community. ARPA is paying for or conducting studies of decision theory, quantitative indicators and forecasting techniques, methods applicable to early warning, and artificial intelligence.

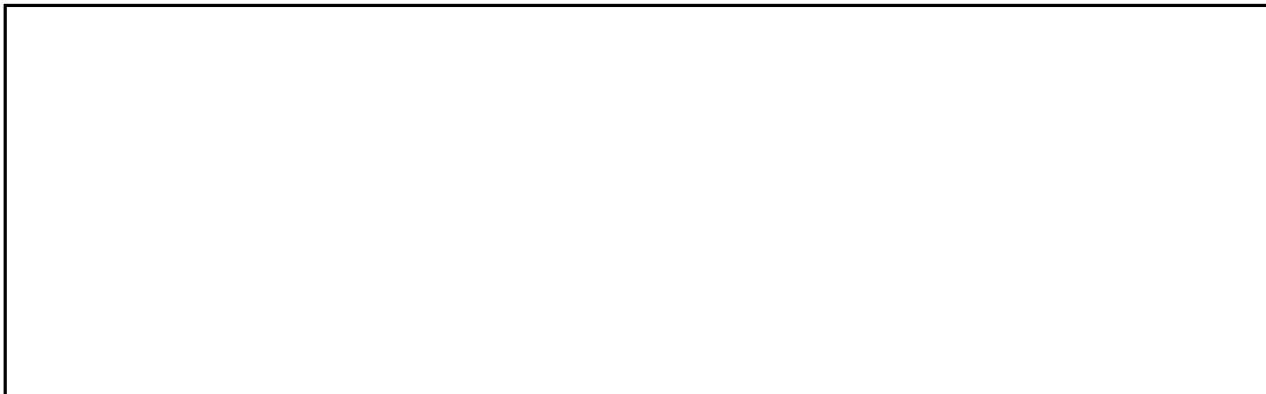
ARPA is funding six major contractors to conduct studies in the field of decision theory which analysts at ARPA believe has a number of very promising applications to the work of some intelligence analysts. It is expected-- and has in some instances been demonstrated--that decision theory can be applied to problems in forecasting, the expression of uncertainty in estimates, the study of negotiations, and the allocation of resources. With respect to forecasting, decision theory should encourage, not the elimination of subjective judgments, but more rigorous and explicit expressions of them.

The development of quantitative indicators and of forecasting models and techniques has been another concern of ARPA's research. In one program, ARPA, with the assistance of Consolidated Analysis Center, Inc., is working on numerical indicators of international and domestic events. These indicators suggest trends in and relationships among various political, economic and military

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events and will, it is hoped, provide analysts a novel and useful means of interpreting and forecasting events within and among countries. In addition, models for forecasting distant and more immediate political and military environments have been devised and are now being applied to different regions of the world.



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ARPA has also assisted in the development of complementary political indicators for the same purpose, but such indicators have not yet been completed or tested.

The Interactive Analyst Station, a project of ARPA and the Rome Air Development Center, is an attempt to develop advanced methods for indications and warning analysis. In this project, the Synectics Corporation, the Cambridge Project, and the Center for Computer-Based Behavioral Studies at the University of California at Los Angeles have developed a variety of techniques which employ computers and which facilitate both the retrieval and the analysis of information. ARPA is studying these techniques, assessing the degree to which they support indications and warning analysis, and attempting to apply

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to such analysis those techniques that have promise. A preliminary system has been developed which can be used for demonstrations and tests. In the next phase of the program this experimental system will be refined and then further tested at the Strategic Air Command.

ARPA has also sponsored a program to study the security implications of the exchange of technology and of expanded trade with the USSR, Eastern Europe, and the People's Republic of China. The elaboration of models of the processes by which the USSR, the PRC, and Eastern European countries apply technology obtained through trade and exchange agreements has been undertaken. New information and the results of certain case studies will be used to test these descriptive models and will provide a basis for judging their use in prediction. The results should be helpful in determining the strategic implications of the transfer of technology. The study may also provide the understanding needed to make more critical judgments on the direction that Soviet military technology is taking.

Several offices at ARPA are investigating the possible uses of artificial intelligence. The latter is not a single technique but a relatively new branch of computer science that draws upon a number of disciplines--psychology, logic, epistemology and engineering, among others--in an effort to understand certain intellectual processes and, when it is possible, reproduce them with a computer. There

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are a number of ways in which such an approach might be applied to intelligence. It may be possible, for example, to prepare a model of the ways in which decisions are reached in a foreign government, but a model distinguished from others by the addition to it of the ready, intuitive judgments that analysts have formed concerning politics in that country. In one such application, ARPA's Tactical Technologies Office is supporting the development at the Rand Corporation of a model of terrorism. The work of ARPA's Information Processing Technologies Office on the manipulation of very large data bases and on "intelligent terminals" also makes use of artificial intelligence. (Intelligent terminals are computer terminals that will permit analysts to do more quickly such routine tasks as searching their files, keeping records, etc.)

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The State Department

The State Department's Bureau of Intelligence and Research has in the last few years commissioned several studies directed, in part, at determining the usefulness of quantitative techniques for research in foreign affairs.

The most ambitious, Project Quest, was conducted by PRINCE Analysis, Inc., under a contract with the Bureau's Office of External Research. The study attempts to offer a systematic answer to the question of the usefulness of new analytical methods.

The authors wished to discover whether it was possible and desirable to use in the work of the Department of State the frequently quantitative methods employed by academic students of comparative politics and international affairs. To do so they undertook first to examine the work of analysts in INR from the perspective of a social scientist. They concluded that the analysts use quantitative techniques infrequently and in thoroughly traditional ways; that the analysts make predictions that are concerned with the immediate future or which fail to specify the period to which they apply; and that the analysts' concerns are considerably broader and more complex than those of their academic counterparts. This last observation was especially pertinent, for, according to the study, "in spite of more frequent and sustained attempts to deal with these analytical complexities,

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the quantitative scholar in comparative politics and international relations has not made sufficient progress at this time to be of use to the foreign affairs analyst."

While existing quantitative research thus appeared to offer little assistance to the considerably more demanding work of INR's analysts, it still seemed possible that particular quantitative techniques might bring greater rigor and precision to bear on specific analytical problems. The authors devised six case studies to see whether this was so, choosing topics which were pertinent to the work of INR's analysts and which lent themselves to treatment by one or more quantitative methods. (Among the techniques used in the studies were regression analysis, correlation, and computer simulation and modeling.)

The case studies suggested that certain techniques could assist analysts in some but by no means all aspects of their work. For what the authors called "information gathering," quantitative methods, such as content analysis, were found to be useful: they encouraged clarity, the recognition and analysis of trends, and the systematic comparison of events. Employing such methods also made easier the use of information already in numerical form, like data on international trade, voting and the cost of living.

The quantitative methods used in the case studies were less useful for explaining events--for "testing

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assumptions and hypotheses"--primarily because of the great variety of influences that an analyst must consider. The authors concluded that the final activity into which they divided the work of an analyst, forecasting, might at times benefit from the use of such methods as correlation techniques, trend analysis, and the Delphi technique.

INR has commissioned other studies similarly aimed not at applying an analytical method to a particular issue but at determining more generally whether new techniques will further the Bureau's work and, if so, how they should be used. A paper written for INR by Lincoln Bloomfield of MIT's Center for International Studies reviewed the recent literature of the social sciences, particularly that concerning the development of theoretical structures to guide analysis, for the value of this work to the improvement of the policy process. Bloomfield's survey led him to a number of suggestions for applying developments in the social sciences to the work of the State Department. He proposed that in their reporting, Foreign Service officers keep in mind explicit theories of political behavior, such as the Bureaucratic Politics Model. He recommended also that analysts be trained in the use of such formal forecasting methods as the Delphi technique. The ability of the State Department to anticipate issues would be improved, he thought, by the readier acceptance of dissent within

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the Department, by the use of political games, and by a continual, critical examination of the policy process. He urged that the Department undertake case studies of its own operations and that periods of routine activity as well as operations during crises be studied.

The Center for International Studies also conducted for the State Department a study of "global interdependence"--the ever closer economic, cultural, political, and strategic ties between states. As part of the project, members of the Center examined in some detail the question of whether it was possible to devise methods and concepts that would aid the study of interdependence. They concluded that there were indeed certain "methodological maxims" that should be borne in mind. The maxims specify the ways in which analysts should consider such influences on the interdependence of states as the international milieu; the policies, resources, and histories of the nations under study; etc. (Among the pithier maxims was this helpful injunction: "Sequentially explicit construction heuristics [design principles] must be explicated; otherwise their operational meaning remains obscure.")

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10 November 1975

AD/DCI/IC

D/DCI/IC

This is a comprehensive survey by
 of the Community's use of
new analytical methods. It is the successor
to an earlier study done on contract but never
published because of certain weaknesses. I
think this is a good job, worth disseminating
to USIB agencies and perhaps to the Working
Group of the NSCIC as well.

C/PRD

MEMORANDUM FOR: ETHC

Hank:

This appears to be a useful compendium of what's going on in this loosely defined area of "improving analytical methodology". It leaves me vaguely dissatisfied, however, in its vacuum cleaner approach. There is no real qualitative commentary on what ~~looks promising~~ ^{has} ~~the~~ ^{the} effect to ~~improve~~ ^{improve} ~~methodology~~ ^{methodology}.

(DATE)

that need encouragement or
help. Perhaps I ask too much.

ad

|||

MEMORANDUM FOR [REDACTED]

Al:

I'm embarrassed at the length of time I've had this (and I still haven't managed to read it). Pls discuss your concerns with [REDACTED] and see where it leads.

[Signature] (DATE)

8 January 1976

NOTE TO EO/ICS *M*

1. An evaluation of the methods that are described in this survey would be useful, but we believe an attempt at one now might be premature. In many cases the analysts who are trying to bend these new techniques to their own purposes are themselves uncertain how productive their efforts will ultimately be. Until such judgments can confidently be made, moreover, it will be difficult to determine which of several approaches to this still experimental work will prove most rewarding. (The paper does offer some tentative judgments on this question.)

2. Despite the (considered) omission from the paper of an evaluation of these methods, it should nevertheless be useful as a survey of the Community's work in this field, and we recommend that as such it be forwarded to Mr. Knoche and Gen. Wilson.



! C/PRD

Attachment:

A Survey of the Community's Use of
New Analytical Methods

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COMMENTS:

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25X1A

[redacted] has compiled a description of Intelligence Community projects and activities aimed at improving analytical methodology.

[redacted] recommends that 25X1A it be disseminated to USIB and the NSCIC Working Group

1-3 Dick:

Let's discuss

[Signature]